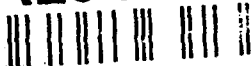


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STUDY
PROJECT

FUTURE FORCE DESIGNS: ARE WE INTERESTED IN PROTECTING RICE BOWLS
OR WINNING THE NEXT SUPER BOWL?

BY

Lieutenant Colonel Michael C. Pascoe
United States Army

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FUTURE FORCE DESIGNS: ARE WE INTERESTED IN PROTECTING RICE BOWLS
OR WINNING THE NEXT SUPER BOWL?

AN INDIVIDUAL STUDIES PROJECT

by

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Project Advisor

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Over the past three years there has been a dramatic and significant change worldwide. We have witnessed the fall of the Berlin Wall and with it has gone the threat that has defined the structure and size of the United States military over the past four decades. From the pentomic divisions of the '50s and '60s to the Army of Excellence (AOE) structure of the '80s, the design of our divisions and corps stemmed from parochial beliefs and consensus as much as from a capability to respond to any particular threat. In this paper the author purposes a need to depart from the traditional consensus-building approach used in the past in designing a force. In particular it emphasizes the need to capitalize on those systems that recent advances in technology have provided. As the Army undergoes downsizing, adopting a plan that simply takes our current division and corps structures and makes fewer of them is a bankrupt strategy. A methodology must be used that builds structure that can be tailored quickly, respond rapidly, and can best contribute to warfighting.

INTRODUCTION

It would be an understatement to say there has been a significant and dramatic worldwide change over the last three years. We have witnessed the fall of the Berlin Wall. Overnight the threat upon which the United States Army has focused and substantiated its existence over the past four decades has disappeared. Recent global change has been revolutionary. As the Army downsizes, we are transfixed on adjusting to this dramatic shift of events as we restructure for the future. From the pentomic divisions of the '50s and '60s to the Army of Excellence (AOE) structure of the '80s, the design of our divisions and corps resulted from senior leadership consensus as much as from responses to any particular threats. Our habit of designing forces through a consensus-building process has worked reasonably well during periods of evolutionary change. Unfortunately, we are now embarking upon an era of revolutionary change. Thus as the Armed Forces, particularly the Army, become smaller, it will be become more important than ever to have forces capable of protecting our vital interests abroad--forces that can be tailored quickly, respond rapidly and can best contribute to warfighting.

"The purpose of military organization is to deploy available human and material resources in order to produce the greatest possible effectiveness in combat."

Martin van Creveld

Armed helicopters provide the Army the punch and versatility required in the 21st Century. In this paper, I will attempt to develop this premise through rationale at a macro-level as opposed to putting any particular organizational design down on paper. Too often, force planners rush to propose a structure that reflects little change from the one currently in existence. Worse yet, they suggest one that reveals parochial bias, rather than first accomplishing the harder, farsighted conceptualization work that is required. Will we adjust our traditional ways of doing business and adopt new and innovative force structure designs? Or will we be paralyzed by the long-held paradigms that have driven our structure over the past 45 years and thus possibly jeopardize the Army's future overall combat efficiency?

The Changing World Environment

The Cold War is over and the United States won it! For more than four decades, America has focused its energy on containing the threat to the free world from the forces of communism. Since the end of World War II, containment of Soviet power and influence has been the cornerstone of U.S. foreign policy. As a result, our assessment of the threat, and its related capabilities, has provided the basis on which we have structured

the armed forces. A threat-based strategy has, in the past, served us well, but it is not now the most effective means to determine the future size and composition of the Army. For the United States to remain a world-class superpower, it must have the capability to project a credible military component of national power. A strategy that focuses on capabilities rather than threat is a more effective method to accomplish this goal.

With few exceptions, the decades of the Cold War were a period of relative stability in our national security environment. Several factors accounted for this: a common threat, a stable alliance to confront that threat, and a consistent national security policy. Our policy of containment and the relatively consistent application of this policy over the long-term contributed most to our success. This policy, in a bipolar world, led to the development of a military strategy that focused on a single threat, usually in a single region of the world. The key components of this strategy were: deterrence, forward defense, and coalition warfare.

Since shortly after the end of the second World War, the Soviet Union and the Warsaw Pact have served as our primary focus of attention. The location and nature of this threat resulted in a strategy that had a Eurocentric rather than global focus. This "opponent capability" drove everything from force design to doctrinal development. Our acquisition programs offer a

case in point. They were based on identified needs, based on current and projected military capabilities all determined in the context of a military threat.

A threat-based military strategy has merit when a clearly definable opponent exists. Emphasis on the threat provides a specific and tangible focus. It also serves as a basis for precise scenario planning once major assumptions are established. The problem with this approach is that it works best only when your military strategy is one of containment.

The historic shift in the tectonic plates of the Cold War, to use Joseph Nye's metaphor, has unleashed forces that are reshaping the strategic landscape. For more than forty years the former balance of power has been a major factor in fostering stability. We are now, however, shifting from a bipolar world to a multi-polar one in which regional economic, political and military powers and alliances are emerging to fill the voids left from the decline of the former Soviet Union. The result is that we could have a potentially less stable and peaceful world.

At its most basic level, the national strategy of the United States has moved from a traditional focus on containing Soviet expansionism to a broader and more active role of engagement throughout the world; this strategy is designed to protect and advance U.S. interests, along with those of our allies and coalition partners.¹

Changing world events require a new national security policy and military strategy that places emphasis on three newly defined

concepts: forward presence, power projection, and force reconstitution. The Chairman of the Joint Chiefs of Staff, General Colin Powell, is moving in this direction as indicated in the base force concept he presented to Congress in February 1991. In effect, he has established a base force that can accomplish the missions required to achieve and promote global stability.

First, the United States will maintain a forward military presence in areas where presence is necessary to protect our national interests. Steps are now being taken that will produce fewer forces abroad than we had during the era of containment, especially in Europe. Forward presence will take the form of some forward-deployed land and air forces, pre-positioned equipment afloat and ashore, periodic joint and combined exercises, security assistance operations, and carefully cultivated nation-to-nation relationships designed to advance mutual goals in crucial areas of the world.²

The most essential aspect of this new strategy lies in the second element--the projection of power from within CONUS to trouble spots around the world. We must have the capability to project military power whenever U.S. interests are threatened. We must have the ability to move personnel and equipment to the scene of the crisis quickly and in sufficient numbers to gain a favorable outcome. Power projection is a difficult, complex operation; it requires ready, mobile fighting forces and the proper mix of airlift, sealift, and pre-positioned equipment and

supplies. Our ability to project power and conduct forced entry as required is an important component to deterrence and regional stability.

The last important facet of our military strategy deals with the notion of reconstitution. Historically, United States peacetime military strength has been governed by the size of the Soviet threat. While U.S. reductions are not proportional, the reductions occurring in the Soviet Union are influencing the relative size of America's military forces. This phenomena will test our ability to reconstitute a large, effective defense force should the need arise. The challenge in preserving this potential will require foresight in protecting infrastructure, in preserving a viable industrial base, in investing in high-payoff technologies and in developing competitive strategies, and in structuring reserve units adaptable to activation for the appropriate mission.

Together, these elements of our national strategy have important implications for the Army and the way that the force should be reshaped for the future. The Army Chief of Staff has repeatedly stated that we are building our future Army by following the blueprint of the six enduring imperatives that have served as the foundation for the today's Army.

AirLand Battle Operations

The original AirLand Battle Concept, developed in the early '80s, was developed in the context of the U.S.-Soviet conflict. It focused on combat operations in central Europe against a massive, echeloned Warsaw Pact threat; it was driven by the concept of forward defense. This concept came about largely to compensate for an imbalance of forces that existed between NATO and the Warsaw Pact.

The evolution of AirLand Operations doctrine builds upon the original umbrella concept. It considers the U.S. Army's need to transition to power projection from forward defense; it provides a capability for operations across the operational continuum; and it incorporates lessons learned from operations Just Cause and Desert Shield/Storm.

Airland Operations refocuses the concept and capabilities of AirLand Battle for a strategic Army and changing environment. It is a versatile concept for employment of Army forces in joint, combined, and interagency operations with application throughout the operational continuum of war, conflict, and peacetime competition.'

In the years ahead, we can expect to see warfare change in several important ways. Increasingly, we will fight on less dense, more open battlefields. Though these less-structured battlefields will be more common at the operational level, they will occur at the tactical level as well. Because most nations will field fewer forces, due to arms control agreements and the high costs associated with modern armies, we will often be faced with situations where we must accept large gaps between our

forces. To conduct decisive operations, commanders at all levels will have to possess the ability to concentrate their forces. This will present more risk, as large areas will be left uncovered. The concept of nonlinearity anticipates this condition on the future battlefield; nonlinear warfare prescribes the method of fighting. This more open, less structured battlefield means that at the operational level--in mid to high-intensity conflict--commanders must be prepared to fight a nonlinear battle. We will need to employ systems that allow commanders to mass dispersed forces to fight a highly synchronized battle--one that is seeks primarily to destroy the enemy. If we are going to fight under these conditions and win, we must utilize the appropriate systems and develop force structure designs that best apply.

Designing The Force

AirLand Operations explains what the Army must do to succeed in an environment that is already upon us. A strategic Army must be able to support the national security strategy. We must be versatile, deployable, lethal, and expansible. These characteristics and this concept form the framework within which we will develop the doctrine, design the organizations, establish the requirements for materiel, and determine how we train and develop leaders. It will provide the azimuth for reshaping and modernizing the Army.'

If versatility, deployability, lethality, and expansibility are the enabling characteristics that determine future forces design, then why are we attempting to take our current division and corps structures and simply make less of them?

Changes in the world environment have caused the political leadership (rightly or wrongly) to view the current size of the armed forces as exceeding the needs of our national security and our ability to protect our strategic global interests. As our Army downsizes to a 12 division/3 corps-sized force, current plans call for using the same basic division design and simply structuring fewer of them. Why do we want to maintain the current relative distribution of combat power when it will result in an Army that is suboptimized in the aggregate? We can in fact compensate for this deficit by capitalizing on the systems that technological innovation has provided. Our failure to redesign the ideal force come primarily from parochialism and resistance to change.

History repeatedly reveals how technological advances have revolutionized warfare. From the musket loader to Springfield repeating rifle during the Civil War, from horse-mounted cavalry to the tank at the end of WWI, technology has impacted from the tactical to the operational level--many times with dramatic results. During operation Desert Storm, we witnessed repeatedly what technology brings to the fight with the effectiveness of the Patriot missile defense system against the Scud and the lethality of the night-fighting, Apache helicopter armed with hellfire missiles. Some view technological advances in weapons systems as an opportunity for change, while others consider new technology simply as an enemy of the status quo.

Future Role of the Armed Helicopter

Modern history has recently provided us with two examples that serve to mark the left and right limits of the operational continuum--JUST CAUSE and DESERT STORM. Two short years ago in Panama, we were enjoying an unequivocal victory over tyranny in Panama achieved through the application of our technology and our military might. Operation JUST CAUSE saw operations in which armed helicopters, in particular the Apache, delivered ordnance with devastating precision, destroying armored vehicles and strong points located in populated areas: all of this conducted under the cover of darkness.

Last year, little did we know that we were on the verge of a major war with what was once the world's fourth largest army. Unlike the army in Panama, Iraq's army was comprised of battle-hardened soldiers and equipped with capabilities similar to ours. Not only did our highly successful joint and combined campaign confirm our current doctrine, it served to prove that it is in this environment that aviation, and in particular attack helicopters, provides an integral part of our land forces. We witnessed a new and exciting opportunity to capitalize on technological advances that can make a significant contribution to warfighting.

As the Army struggles with the reality of downsizing, it stands at the threshold of a unique opportunity to write a new chapter in land warfare--one that optimize the characteristics of

versatility, lethality, and deployability. Attack helicopters epitomize maneuver warfare in their ability to enhance mobility elevating it from a two-dimensional capability into a third. This third dimension of mobility will play an increasingly critical on the future battlefield. As our doctrine under AirLand Operations evolves, we will become increasing force oriented in the prosecution of warfare. This style of fighting diminishes the need to seize and hold terrain. General John W. Foss, former Commanding General, Training and Doctrine Command, has declared that: "Army Aviation is the key link in the evolutionary change in warfare. Aviation has redefined mobility and mobile firepower on the battlefield."⁵

Historical Development

The need for rapidly deployable and mobile forces has been recognized for some time. Fifty years ago, the Army put its first helicopter into military service. By 1952, we had formed 12 helicopter battalions; 400 helicopters were fielded by the end of the Korean War.⁶ Ten years later, in August 1962, LTG Hamilton H. Howze submitted a report examining the roles and missions of aviation in the Army. The Howze Board, as it is commonly known, convened the previous year after former Secretary of Defense Robert McNamara reviewed the Army's plans for modernization and felt that they were "dangerously conservative." He then charged the Army to re-examine the use of helicopters as

a new way to enhance land warfare mobility, emphasizing "I shall be disappointed if the Army's reexamination merely produces logistically oriented recommendations to produce more of the same, rather than a plan for employment of fresh and perhaps unorthodox concepts which will give us a significant increase in mobility."⁷

The most significant charter given to the board was to investigate, test, and rate organizations, operations and concepts associated with airmobility. This was done through a series of experiments that compared a conventionally equipped force with one made airmobile by the substitution of aircraft for ground vehicles. Not only did the results show that aircraft enhanced the effectiveness of both conventional and unconventional operations, but they also found that a smaller force could achieve the same missions. The result was the implementation of an air assault division structure made up of an increase of 359 aircraft and a decrease of 2,352 ground vehicles over the standard division. Requirements for strategic deployment were reduced significantly.⁸

In 1972, ten years after the Howze Board was formed, the Army had been through the crucible of Vietnam. Terrain and the nature of the enemy made this the war of the helicopter. Without the introduction of the helicopter and the evolution of airmobile doctrine, we could not have achieved the successes we did on Vietnam's nonlinear battlefield. Most of today's senior officers could not have accomplished many of the successful tactical

operations, logistics resupply, firebase support and medical evacuation operations without the superior mobility and versatility of the helicopter.

The AH-1 Cobra gunship came onto the scene in the early '70s and provided a quantum leap in attack and armed reconnaissance capabilities. This was the first helicopter specifically designed to perform these missions; it supplanted the C model UH-1 Huey that evolved from troop carrying platforms. By exploiting the third dimension of maneuver warfare, the Army maintained a tremendous tactical advantage over the elusive, unconventional Viet Cong and often over larger conventional North Vietnamese regulars as well. General Vo Nguyen Giap stated that Viet Cong and North Vietnamese soldiers feared the sounds of our helicopters more than anything else on the battlefield.

Searching for the Proper Design

The challenge to today's force designers as we build down the size of the Army is to create an organizational structure that optimize the characteristics of lethality, versatility, and mobility. However, emphasis on one characteristic in isolation from the others can surely create inadequate design. Further, these characteristics must be properly balanced as they are applied across the operational continuum. For example, the most strategically deployable forces in our Army are neither especially lethal nor particularly mobile once deployed against a

mechanized, mid-intensity foe. Our heavier elements, while effective in this scenario, could take weeks to reach the theater--enough time for a determined adversary to complete his objective.

The business of force design is a two-dimensional process: we must build structure that has maximum strategic deployability and greatest battlefield effectiveness across the entire spectrum of conflict.

Mobility

Attack helicopter units offer the Army increased strategic mobility. Not only are they capable of rapid self-deployment (through the use of auxiliary fuel tanks), they increase a division's or corps' strategic tempo since they can be easily transported by limited air or sea assets. While sealift is essential to a protracted campaign, airlift is absolutely vital to success in short-notice, contingency operations. The term "fighting a war by C-5 loads" is a real-time concern to the decision maker who is faced with deciding how to get the maximum combat power in theater with the airlift that is available.

Figure 1 compares the strategic mobility differential between two types of combat systems: attack helicopters and tanks. The figure shows that the current C-5 fleet can airlift nearly three brigades of attack helicopters in approximately the number of sorties required to move a battalion of tanks. This is

not to say that the attack helicopter should replace the tank. It merely demonstrates that large units of attack helicopters can be deployed quickly and can thus be used to employ combat power early in a conflict until sealift arrives with heavier units.

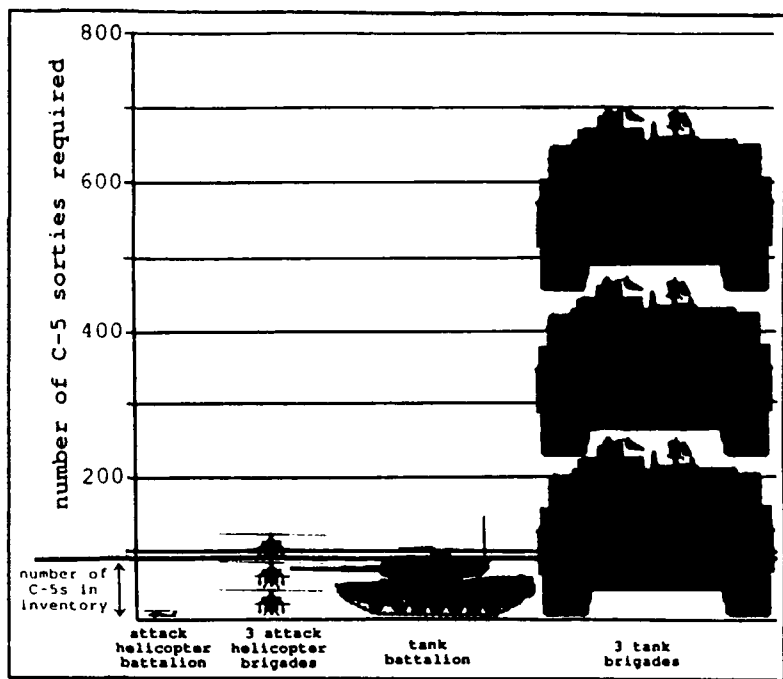


FIGURE 1: A comparison between two combat units (attack helicopter and tank) in the number of sorties required in a campaign.⁹

Operation Desert Shield provides a recent example. "Arriving with the First Tactical Wing, the paratroopers of the 82nd Airborne hit Saudi Arabia in combat gear outmanned and outgunned ... It had no tanks of its own and none arrived for weeks. For the first 100 hours of the operation, Army Chief of Staff Gen. Carl E. Vuono agonized over the vulnerability of the 82nd ... (Gen) Schwartzkopf had to improvise a credible defense from whatever he could scratch up ... While he was waiting, he ordered all the tank killers he could lay his hands on: ...more Apache(s) ...with their hellfire missiles."¹⁰ In fact, the 82d Division Ready Brigade deployed with their organic Apache battalion. For weeks after the initial deployment, the backbone of the defensive effort rested with the AH-64's of three attack

battalions. These battalions were given missions to defend in sector where no other force was available. Over a wide range of potential scenarios, aviation offers the best return on the "airlift investment" --especially, but not exclusively, in the early stages of deployment.

Lethality

The lethality of helicopter formations has been known for some time. The Howze Board found that "the volume of effective firepower that can be delivered accurately from aerial platforms with speed and surprise gives a shock effect previously associated only with violent armor attacks."¹¹ Advances in technology have dramatically increased this lethality and the additions of such weapons systems as the Apache, Comanche, Abrams tank, and the Bradley Fighting Vehicle indicated the need for an updated review. Analysis of unit lethality was recently conducted by the U.S. Army Training and Doctrine Command (TRADOC). When various designs for a deployable, light armored cavalry regiment (ACR) were wargamed under a guard scenario, two important points emerged: First, was that all the light cavalry regiment designs out-performed the current heavy ACR. The second concerned the lethality of the various combat systems modeled.¹²

TRADOC data (see Figure 2) reveals a dramatic difference in lethality between the Comanche and other combat systems modeled.

The direct fire potential of the Apache, using Hellfire missiles, would probably produce similar results under other appropriate scenarios.

The system exchange ratios shown in Figure 2 measure both

lethality and survivability--the ratio of enemy systems destroyed to friendly systems lost. In this scenario, the RAH-66 Comanche in the regiment killed 145 enemy vehicles while losing 1 helicopter. Additionally, the Comanche was shown to be the predominate killer in all the various designs.¹⁴

Advances in technology have provided the capability to destroy a target at ranges that exceed those of your adversary. Some of the first shots of Operation Desert Storm (ODS) were fired by eight Apache helicopters of the 101st Air Assault Division. Armed with auxillary fuel tanks, Hellfire missiles, and 70mm rockets, the Apaches of Task Force Normandy flew nearly 500 nautical miles deep into western Iraq to destroy two early-warning radar sites in an attack that began at 0238 hours on 17 January 1991. The laser-guided missiles destroyed radar antennas, operation centers, generators and barracks at two

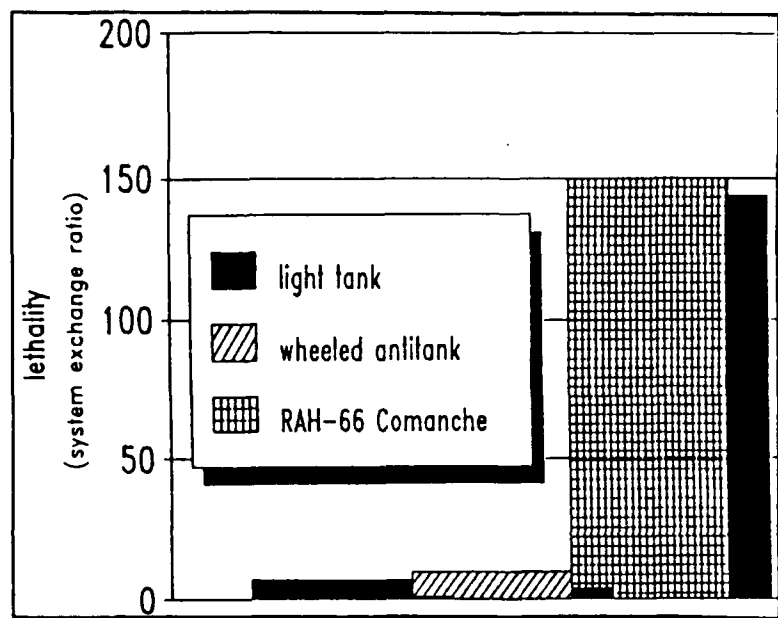


FIGURE 2: Results of TRADOC wargaming.¹³

sites, while enemy vehicles were "hosed down" with more than 4000 rounds of 30mm cannon fire. Within seconds, critical radars were off the air. Both sites were rendered ineffective in less than four minutes. This operation punched a black hole in the Iraqi air defense network that cleared the way for more than 100 Air Force bombers to descend on Baghdad undetected.

Preeminence of Air Maneuver

Field Manual 100-5 defines maneuver as the "movement of forces in relation to the enemy to secure or retain positional advantage. It is the dynamic element of combat--the means of concentrating forces at the critical point to achieve surprise, psychological shock, physical momentum, and moral dominance which enables smaller forces to defeat larger ones."¹⁵

Operation Desert Storm marked a significant milestone in the maturation of tactical and operational thought. Theorists had long envisioned the potential of large formations of helicopters and rapid ground elements working within a complementary framework of relational maneuver. The battle calculus of ODS permanently altered the way that division and corps commanders exploit maneuver in the third dimension, to secure tremendous advantage for the combined arms team.

"It was the Apache that was the single biggest maneuver factor on the battlefield."

MG Barry R. McCaffrey
Commanding General, 24th ID (M)

The theorists were proven correct. As General McCaffrey pointed out, attack helicopter maneuver doctrine has matured to the point of becoming one of the most decisive forces on the battlefield. Attack helicopters are, however, only a part of aviation maneuver. The best example of aviation maneuver at the operational level during ODS was the air assault envelopment conducted by the XVIII Airborne Corps. Other examples include the deep VII Corps operation to help close the escape routes around Basrah. Attack and assault helicopters moved out from divisions and corps to find, fix, or destroy enemy formations. Aviation maneuver at the tactical level took place in each division. The VII Corps excelled at closely synchronizing operations that located and fixed the enemy with air maneuver and then applied rapid ground maneuver to complete the destruction.

Both air and ground operations benefitted from the reconnaissance in depth provide by Army Aviation. Days prior to the start of the ground offensive, attack, scout, and special operations aircraft performed repetitive armed recon missions in each division's sector. The use of armed helicopters far in the advance of combined arms formations embody the spirit of the cavalry; they provided critical tactical information to force commanders in a fast-moving campaign and served to accelerate the tempo of combined and joint operations.

As the battlefield of the future trends toward higher and higher tempos, more emphasis must be placed on the helicopter's

ability to move quickly and see deeply, then to maneuver and focus tremendous destructive power at great depths.

Operation Desert Storm showed that the best use of armed helicopters was out-front, integrated with offensive maneuver schemes at the division and corps levels. Essentially, two different techniques were used. The VII Corps, which delivered the main destructive blow against the Iraqi center, used attack helicopters as an integrated maneuver element at the divisional level. The XVIII Airborne Corps was tasked with the mission of an operational-level envelopment. Within this mission, attack helicopters provided a high operational tempo that allowed the Corps to complete the wide turning movement to the east, thereby cutting off the escape routes of the Iraqi Army. Also, in both Corps the fluid tactical situation created problems for attack battalions placed under the operational control of ground maneuver brigades. Because the front-line trace changed so rapidly, brigade commanders were often reluctant or unable to deconflict airspace usage, required by both aviation assets and fire support units. Additionally, the environmental conditions experienced during much of the war made it extremely difficult to distinguish between friendly and threat forces in and around the FLOT. These problems reduced our combat efficiency. Attack helicopters waited in holding areas for hours, when they could have been used with greater effect throughout the depth of the battlefield. The lesson here is that the best use of attack helicopter organizations is out-front, where they should remain

under the operational control of the division or corps, rather than under smaller maneuver elements.

While the classic "deep attack" mission, with its hours of preplanning and intelligence preparation, has been institutionalized for some time, it was rarely conducted. In the joint environment, Army Aviation, performing deep attack missions, was supported by Air Force systems like the EF-111, Compass Call on the C-130, and the Wild Weasel mounted on the F-4 and F-16. When the initial deep attack doctrine was written by TRADOC, it was commonly believed that these specialized systems would normally not be available for Army missions. In actuality, the joint targeting cell frequently recognized the importance of these missions to the overall campaign objectives and thus tasked these Air Force assets for support.

The ineffectiveness of the Iraqi air defenses and the efficiency of the joint targeting cell quickly resulted in a change of tactics, techniques, and procedures. Attack helicopters began conducting cross-FLOT missions without extensive preplanning. Strategic intelligence assets, such as Joint STARS, provided near, real-time routing information that kept the attack helicopter formation away from enemy units along ingress and egress routes. Attack helicopter units were able to perform these deep missions more frequently and with greater success than was ever envisioned before the war.

Future Force Designs

As we undergo downsizing, we must seriously consider the current design of our divisions and corps. Force designers must envision the end state of the Army and then structure the remaining assets into organizations that contribute most to warfighting. It is critical to the security of the nation, and to the Army as an institution as well, that these visionaries be unbiased and non-parochial in their approach. Technological advances in weapons systems have rendered many long held adages obsolete: The tank is no longer the best killer of another tank. Future heavy division structure does not need to be "heavy" in a literal definition of the term. Heavy should equate to the capability to defeat armored or mechanized forces. For example, a division no longer requires a three-tank or two-tank/one mechanized brigade structure to accomplish this task. If we consider more radical designs we could be developing structures that increase lethality, increase operational and tactical tempo, and increase strategic mobility. A division structured with one or two attack brigades, with the balance consisting of appropriate armor/mech, would satisfy this requirement "in spades".

Conclusion

History will point to Operation Desert Storm as the first mechanized conflict dominated by the use of massed attack helicopters. Armed helicopters were used in ways rarely envisioned before this conflict. This flexibility provided a valid indicator that air maneuver can become the cornerstone of a force-oriented, non-linear maneuver doctrine. Forces designers must capitalize on a capability that technology has provided. This can be done, but it will require visionary leadership at the senior level. Designers must rely on empirical data and their considered judgement, rather than a consensus approach. Our leadership now must boldly shape the future of the Army by holding institutional bias at arms length. Can it be done during an era of rapidly declining resources, both in terms of money and personnel? Yes! And we must get on with it before it is done by people in agencies of our government who are the least qualified to do so.

ENDNOTES

¹GEN Carl E. Vuono, "National Strategy and the Army of the 1990s," *Parameters*, Summer 1991, p.5.

²Ibid.

³U.S. Department of the Army, TRADOC Pam 525-5, *AirLand Operations*, Washington DC: GPO, 1 August 1991, p.8.

⁴Ibid., p.34.

⁵GEN John W. Foss, "Challenges and Opportunities", *Army Aviation*, vol.39, 31 July 1990, p.6.

⁶Major General R.D. Grist, OBE, "The Future: Of the Armed Helicopter.", *The RUSI Journal*, Summer 1991, p.13.

⁷LTG John J. Tolson, "Vietnam Studies", *Airmobility 1961-1971*, Department of the Army, Washington DC: GPO, 1973, p.19.

⁸Ibid. (paraphrased) pp.18-24.

⁹COL Patrick J. Bodelson and CPT Kevin Smith, "Design for Tempo", *Army Aviation Digest*, March/April 1991, p.13.

¹⁰Peter Turnley, "The Road to War", *Newsweek*, January 28, 1991, pp.61-62.

¹¹U.S. Army Tactical Mobility Requirements Board, *Final Report, Annex O - Field Tests* (Fort Bragg, NC, 31 July 1962), p.2.

¹²The light, deployable ACR study is known officially as the "Air, Ground, Motorized Cavalry (AGMC) Study." The data quoted is from interim products.

¹³COL Patrick J. Bodelson and CPT Kevin Smith, "Design for Tempo, Part 3: Aviation-Mobility and Lethality for Deployed Forces", *Army Aviation Digest*, September/October 1991, p.9.

¹⁴Ibid.

¹⁵U.S. Department of the Army, *Field Manual 100-5, Operations*, Washington DC: GPO, 5 May 1986, p.12.

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